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Posterior Nasal Neurectomy in Treatment of Intractable Rhinitis: A Preliminary Series

Minh Cong Vo, MD[1]
Huu Kien Pham, MD[1]
Minh Hien Nguyen, MD[2]

[1]*Department of Otolaryngology Head and Neck Surgery University Medical Center, Ho Chi Minh City, Vietnam*

[2]*Department of Immunology and Pathophysiology University of Medicine and Pharmacy Ho Chi Minh City, Vietnam*

ABSTRACT

Objective: To evaluate the efficacy and safety of posterior nasal neurectomy on the treatment of nasal congestion, rhinorrhea, sneezing and post-nasal discharge in intractable rhinitis patients.

Methods:

Design: Preliminary Case Series

Setting: Tertiary University Medical Center

Participants: Ten (10) patients with intractable rhinitis underwent endoscopic posterior nasal neurectomy in both sides. Symptoms were compared pre- and post-operatively one month and one year after surgery using Visual Analog Scale (VAS) scores. Endoscopic pre- and one-month post-operative Lund-Mackay scores were also compared.

Results: All four mean nasal symptom scores were reduced significantly at 1-month follow-up for nasal congestion (1.5 ± 1.08 vs 4.1 ± 0.5687, $p = .00001$), rhinorrhea (0.7 ± 0.823 vs 3.4 ± 0.966, $p = .00001$) post-nasal discharge (0.9 ± 0.994 vs 2.4 ± 1.5, $p = .03$), and sneezing (1.1 ± 0.738 vs 3 ± 0.943, $p = .02$). Mean endoscopic scores were also reduced significantly at one month, from 12.9 ± 2.55 to 4.2 ± 3, $p = 0.0001$.In the 6 patients that followed up at 1-year, post-operative mean nasal symptoms were still significantly better for congestion (0.6667 ± 0.8165 vs 4 ± 0.632, $p = 0.00001$), rhinorrhea (0.6667 ± 0.5164 vs 3.67 ± 1.033, $p = .001$), post-nasal discharge (0.1667 ± 0.40825 vs 2.17 ± 1.835, $p = .033$), sneezing (0.5 ± 0.54772 vs 3.17 ± 0.983, $p = 0.0001$). Mean post-operative VAS nasal scores and endoscopic scores were well associated (Correlation Coefficient -.648, $p = .048$).

Conclusion: Posterior nasal neurectomy could be considered as a safety and effective way to treat intractable rhinitis patients in Vietnam.

Keywords: *Posterior nasal neurectomy, vasomotor rhinitis, allergic rhinitis, vidian neurectomy*

Rhinitis is an inflammatory condition of the nasal mucosa that concerns 10 to 20% of the population and is characterized by four nasal symptoms: rhinorrhea, nasal congestion, sneezing and post-nasal discharge.[1] While current medical treatment may be helpful in most patients,

Correspondence: Dr. Minh Cong Vo
Department of Otolaryngology – Head and Neck Surgery
University Medical Center at Ho Chi Minh City, Vietnam
215 Hong Bang St. Ward 11 District 5, Ho Chi Minh City 700000 Vietnam
Phone: +842838554269; +842839525355
Fax number: +842839506126
Email: minh.vc@umc.edu.vn

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there are still those whose symptoms are not resolved and who are not satisfied with medications. In such patients, surgical management may be needed and many procedures have been used including vidian neurectomy, inferior turbinate reduction and posterior nasal neurectomy.[2]

Posterior nasal neurectomy, first performed by Kikawada[3] in 1997, has become an alternative to vidian neurectomy in Japan because it is safe, quick to perform, has less bleeding and almost no complications. However, this procedure has not been applied in Vietnam.

We decided to try this procedure to assess the efficacy and safety of endoscopic posterior nasal neurectomy in the treatment of intractable rhinitis patients. The aim of this study was to evaluate the efficacy of the procedure by evaluating the four nasal symptoms (nasal discharge, nasal congestion, sneezing and post-nasal drip) as well as its safety by noting possible complications, pre- and post-operatively.

METHODS

With approval of the Ethics Review Board of the University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam, patients between 18 – 60 years of age, presenting with four mentioned nasal symptoms of rhinitis lasting more than 2 consecutive years with unsatisfactory relief from conventional medical treatments for rhinitis (including antihistamines, decongestants, oral and topical steroids), were selected for posterior nasal neurectomy at the University Medical Center at HCMC from December 2015 to August 2017 and informed consent was obtained. All of the patients had continuously followed up at the ENT clinics of the University Hospital of Medicine in Ho Chi Minh City for at least one month and agreed to do so one year after the surgery.

Patients with any serious basal medical disease, and those with bacterial sinusitis were excluded, the latter corroborated on routine pre-operative screening nasal endoscopy using a 4.0 mm 0° and 30° nasal endoscope (Karl Storz, Tuttlingen, Germany) and computed tomography (CT) of the paranasal sinuses using a Siemens Somotom Sensation 64 CT Scanner (Siemens AG, Berlin, Germany). Pre-operative endoscopic findings were staged according to Lund-Mackay.[4]

Pre-operatively, patients scored each of their nasal symptoms (nasal congestion, nasal discharge, sneezing and postnasal discharge) using a 5-point visual analog scale (VAS) pre-operatively. Choices were "no problem" (0), "very mild problem" (1), "mild or slight problem" (2), "moderate problem" (3), "severe problem" (4), and "problem as bad as it can be" (5).

Surgical Procedure

Under general endotracheal anesthesia, transnasal posterior nasal nerve resection was performed on both sides. After topical nasal decongestion with 0.1% xylometazoline hydrochloride (Otrivin®, Novartis, Nyon, Switzerland) and submucosal infiltration with 2% lidocaine and 1:100,000 epinephrine (AstraZeneca, Cambridge, UK) a one centimeter vertical incision was made with a No. 15 scalpel blade (Feather®, Japan) behind the uncinate process inferiorly and posteriorly. The mucosa was undermined to look for the ethmoidal crest. *(Figure 1)* To find the pterygopalatine bundle more easily, we used a 2 mm Kerrison Rongeur Punch (Karl Storz, Tuttlingen, Germany) to open the ethmoidal crest and see the full view of the bundle. After exposing the bundle, we looked for and isolated the posterior nerve away from the pterygopalatine artery. *(Figure 2)* In order to resect the nerve, a 5 mm curved blade Sickle Knife (Karl Storz, Tuttlingen,

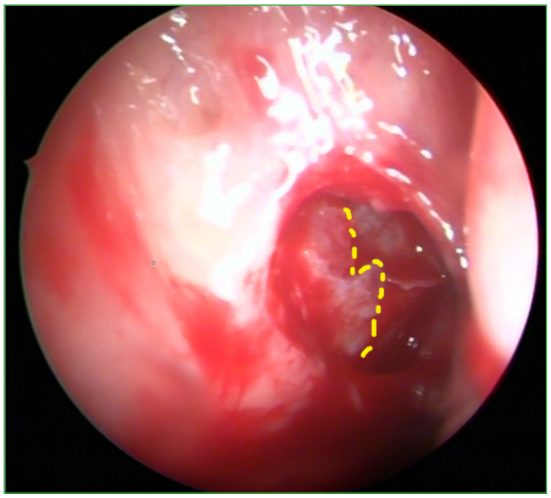

Figure 1. Ethmoidal crest beneath undermined mucosa. Dotted line shows the native border of the ethmoidal crest covering the pterygopalatine bundle and pterygopalatine fossa.

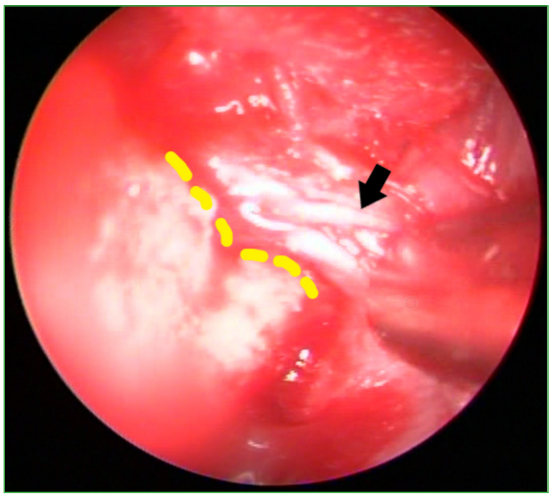

Figure 2. Pterygopalatine bundle; note the posterior nasal nerve (black arrow). Dotted line shows remnants of the native border of the ethmoidal crest which was partially removed by ronguer to expose the pterygopalatine bundle and pterygopalatine fossa.

Germany) or bipolar forceps (Valleylab® Medtronic, MN, USA) cautery was used carefully. Bleeding that could occur occasionally was also controlled using Surgicel® Original Absorbable Hemostat (Ethicon, Somerville, NJ, USA) or bipolar cautery. Normal saline irrigation and post-operative Merocel® standard nasal dressing (Medtronic, MN, USA) was applied bilaterally and patients were monitored for 24 hours and nasal dressing was removed before discharge. Home care instructions were given for nasal saline irrigation with premixed sachets (SinusRinse™ NeilMed® Pharmaceuticals, Santa Rosa, CA, USA) twice a day and follow-up was scheduled for one week, one month and one year.

On follow-ups, post-operative results were noted using both subjective and objective assessments. Subjectively, the patients scored their four most common nasal symptoms (nasal congestion, nasal discharge, sneezing, and postnasal discharge) using the same VAS at 1-month and at 1-year follow-up. Objectively, nasal endoscopy was performed to assess the nose and perform any needed debridement of crusts, from one week to one month after the procedure, and post-operative endoscopic findings were staged according to the Lund-Mackay system.[4] All follow-ups were conducted in our ENT clinic at University Medical Center at HCMC. The patients were requested to follow up again in 1 year with repeat subjective (VAS) assessment.

Data was tabulated by the first author using Microsoft® Excel 2016 MSO (16.0.9226.2114) (Microsoft Corporation Redmond, WA, USA). Statistical Analysis was performed using SPSS® Statistics version 20.0 (IBM Corporation, Armonk NY, USA). Descriptive data were presented as mean ±SD. All the collected symptoms were explored for normality by Shapiro-Wilk test. The paired t-test was used to compare pre- and post-operative subjective (VAS) scores and objective (endoscopic) scores. The Spearman correlation coefficient was used to explore the correlation between subjective (VAS) scores and objective (endoscopic) scores. Differences were considered significant when *p*-value was <.05.

RESULTS

Ten patients, 7 males and 3 females aged 27 to 50 years old (mean age, 33.8 ± 9.05) met inclusion criteria and completed this series between December 2015 to August 2017. Among these, five patients had undergone at least one previous surgery (for nasal septum deviation, inferior turbinate hypertrophy or FESS) and one patient had two separate surgeries (for septum deviation reconstruction and FESS). The 5 other patients had never undergone any nasal surgeries. Routine pre-operative rhinomanometry showed no signs of physical nasal obstruction and routine pre-operative CT scans displayed no signs of the bacterial sinusitis in these 10 patients.

The nasal symptom scores were normally distributed: pre-operative VAS scores (Shapiro-Wilk Statistic .917, df = 10, p = .329) and post-operative VAS scores (Shapiro-Wilk Statistic .910, df = 10, p = .281). All of the four nasal symptom scores were reduced significantly at 1-month follow-up. In particular, the mean nasal congestion VAS score was 1.5 ± 1.08 post-operatively compared to 4.1 ± 0.5687 pre-operatively, t (7.005), df = 9, p = .00001. The mean rhinorrhea post-operative VAS score was 0.7 ± 0.823 compared to 3.4 ± 0.966 pre-operatively, t (7.364), df = 9, p = .00001. The mean post-nasal discharge VAS score was 0.9 ± 0.994 post-operatively compared to 2.4 ± 1.5 pre-operatively, t (4.025), df = 9, p = .03. The mean sneezing VAS score was 1.1 ± 0.738 post-operatively compared to 3 ± 0.943 pre-operatively, t (4.385), df = 9, p = .02. *(Figure 3)*

The endoscopic scores were also normally distributed: pre-operative (Shapiro-Wilk Statistic .873, df = 10, p = .108) and post-operative (Shapiro-Wilk Statistic .890, df = 10, p = .172). The endoscopic scores were also reduced significantly at one month, from a mean of 12.9 ± 2.55 pre-operatively, to 4.2 ± 3 post-operatively, t (7,727), df = 9, p = 0.0001. *(Figure 4)* The mucosal incisions were all well - healed at one month. *(Figure 5)*

Only six patients returned to our clinic after one year. Most of them (5 of 6 patients) were still very satisfied and happy with their nose. However, one patient complained that the nasal congestion had returned. Despite this, we still found significant improvement of all four nasal symptoms for these patients. Their mean 1-year post-operative nasal congestion VAS score was 0.6667 ± 0.8165 compared to 4 ± 0.632 pre-operatively, t (10), df = 5, p = 0.00001. Their mean 1-year post-operative rhinorrhea VAS score was 0.6667 ± 0.5164 compared to 3.67 ± 1.033 before the procedure, t (6.708), df = 5, p = .001. Their mean 1-year

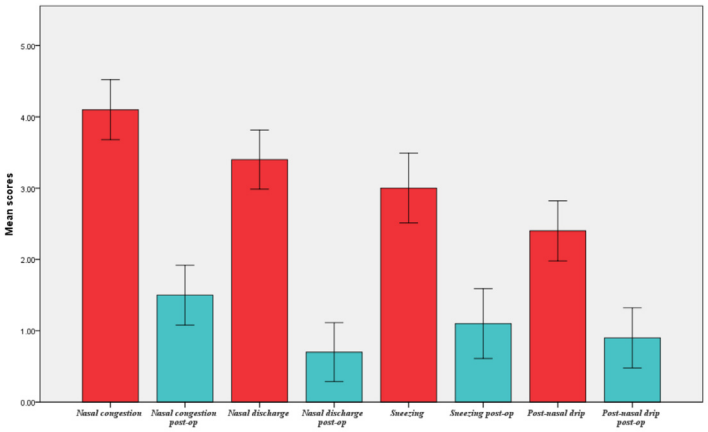

Figure 3. Pre- and 1-month post-operative mean scores of 4 nasal symptoms

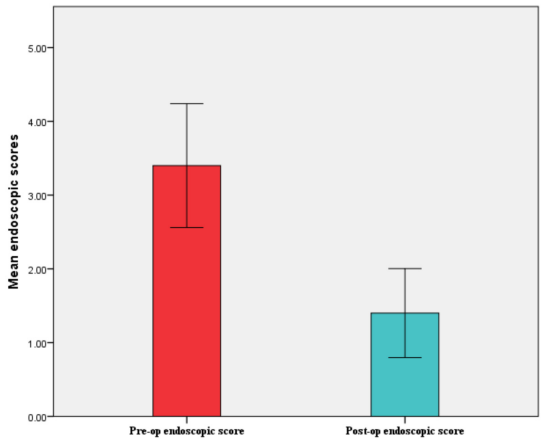

Figure 4. Pre- and post-operative mean endoscopic scores at 1 month

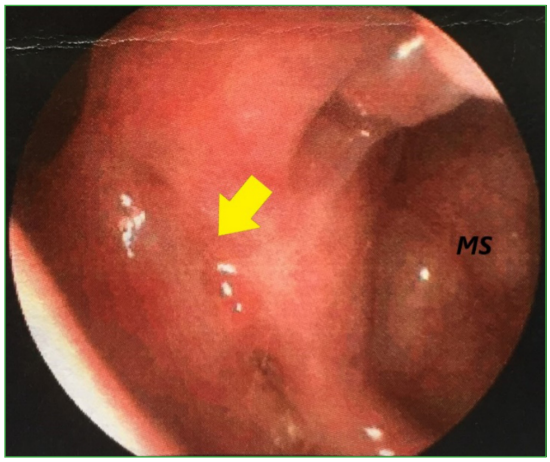

Figure 5. Endoscopic view at one month showing well-healed mucosal incision (arrow). MS, Maxillary Sinus.

post-operative post-nasal discharge VAS score was 0.1667 ± 0.40825 compared to 2.17 ± 1.835 pre-operatively, t (2.928), df = 5, p = .033. Their mean 1-year post-operative sneezing VAS score was 0.5 ± 0.54772 compared to 3.17 ± 0.983 pre-operatively, t (8), df = 5, p = 0.0001.

The incisions healed very well and were hardly seen under endoscopic examination 1 year after surgery and no further endoscopic staging was performed for the six patients.

The mean post-operative VAS nasal scores were well associated with the mean post-operative endoscopic scores (Correlation Coefficient -.648, p = .048), showing that the subjective and objective variables had decreased monotonic relationship.

There were no complications in the 24-hour post-operative period. On longer follow-up, no patients had dry eyes, dry nose, nasal crust or facial/ gum pain, between 1 and 12 months after surgery. Overall, all the patients were satisfied with the results of surgery.

DISCUSSION

This study found that endoscopic posterior nasal neurectomy significantly improved all four symptoms (nasal congestion, nasal discharge, sneezing, post-nasal discharge) of intractable rhinitis in our patients with no untoward adverse effects or complications.

Our results confirm the desired efficacy of over 90% of cases for a follow-up period of 6 months to 2 years reported by Kikawada[3] particularly in reducing nasal symptoms of rhinitis such as nasal discharge, nasal congestion, sneezing and post-nasal discharge significantly. Kikawada[3] also reported more than 80% efficacy in 94 patients after 2 years of surgery which are similar to our findings. Our most significant findings at 1 month were for nasal discharge and nasal congestion with p<.001 although symptoms of postnasal discharge and sneezing also improved significantly with p<.05. These findings are similar to previously published papers.[3,5,6]

Of the 6 out of 10 remaining patients at 1 year (60%), 5 out of 6 (83%) had satisfactory VAS scores. However, one patient was still suffering from nasal congestion. Even though he believed that the procedure obviously helped him with sneezing, postnasal discharge and nasal discharge symptoms, he was still feeling a little bit congestion in one side of the nose occasionally, although it was better than before the operation. To explain this situation, we believe that the main purpose of posterior nasal neurectomy is to disrupt the imbalance between the parasympathetic and sympathetic innervation of the nasal cavity and reduce the nasal secretions.[1,7] As a result, this surgery may help to reduce nasal obstruction as well as nasal discharge and postnasal discharge However, if the patient had severe nasal congestion, we would suggest inferior turbinate reduction along with posterior nasal neurectomy.[8]

Our results also showed significantly improvements in Lund-Mackay endoscopic scores in all patients. Perhaps it can be suggested that not only could the procedure help reduce mucosal discharge and edema seen endoscopically but it also results in good healing post-operatively. The relationship between the post-operative VAS scores and endoscopic scores may imply that the procedure might be more helpful to patients with higher pre-operative VAS scores.

We had no peri-operative complications or adverse events in our study. Intra-operative bleeding was adequately controlled with Surgicel® or bipolar cautery. There was no case of dry eyes, mouth or nasal mucosa, or facial or gingival pain reported between 1 and 12 months after surgery. In all 10 cases, the nasal mucosa healed very well in the medial meatus and did not produce nasal crusts at one-month follow-up. These findings are not very different from those of other authors. As reported by Kikawada[3] among 1056 patients operated on from 1997 to 2005, seven suffered from bleeding (from the back of the nasal septum

or pterygopalatine fossa) in 1 to 4 weeks after surgery. However, this complication can be avoided by intra-operative endoscopic hemostasis with careful endoscopic bipolar cautery.[9] In addition, there was no case of tear duct disorder which cause dry eyes or pain in the upper gum region.

In a previous study by Lee *et al*.,[10] 26 of 85 patients (30.6%) that underwent bilateral vidian neurectomy ended with dry eyes for a short period of time (1 to 2 months) and had to use artificial tears while seven female patients reported no tears when crying (8.2%).[9] In addition, eight patients (9.4%) had lip numbness within one year and 13 patients (15.3%) had mild nasal dryness.[9] Jang *et al.*[11] reported that among 6 patients that underwent bilateral vidian neurectomy, similar symptoms disappeared in 2-6 months although one patient still suffered dry eyes for up to seven years. Thus, the literature seems to support posterior nasal neurectomy as safer and causing less complications than vidian neurectomy. In particular, posterior nasal neurectomy apparently does not result in dry eyes which is the most common and annoying complication of vidian neurectomy.[11]

Our study is limited by the small sample size and lack of a control group. We also did not randomize participants into medication treatment arms nor did we blind the observers performing follow-up assessments. Future studies may correct these limitations to achieve more generalizable results and evidence that might be used for clinical practice decisions.

Meanwhile, our preliminary experience suggests that endoscopic posterior nasal neurectomy through nasal cavity is a simple and safe procedure. It can be done well by an experienced endoscopic surgeon. The surgeon only needs to know precisely the anatomy of this area including the ethmoidal crest and pterygopalatine bundle to prevent injury to the artery which may cause bleeding. Fortunately, bleeding is usually not severe and can be controlled with bipolar cautery. Besides negligible intra-operative hemorrhage, our study resulted in no other complication postoperatively especially dry eyes which are a major drawback of vidian neurectomy. At the same time, the procedure also shows good potential to help diminish nasal symptoms significantly in the short and longer period in patients with intractable rhinitis. We believe that posterior nasal neurectomy is a viable option to treat intractable rhinitis in Vietnam.

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